What is claimed is:

1. A clock recovery circuit for synchronizing a clock signal having frequency of approximately f0 with an optical data signal having a frequency of $N \times f0$, where N is an arbitrary rational number, comprising:

a local oscillator for generating said clock signal;

a sampler for producing an output signal indicative of a phase difference between said clock signal and said optical data signal;

an optical detector coupled to detect said output signal as an electrical signal; and

a mixer for isolating at least one harmonic of said electrical signal and for downconverting said at least one harmonic to a baseband error signal,

wherein said local oscillator is tuned in response to said baseband error signal to synchronize said clock signal with said optical data signal.

2. The circuit of claim 1:

wherein said electrical signal includes a phase error component centered at approximately f0, and

wherein said mixer mixes said phase error component with said clock signal to produce said baseband error signal.

3. The circuit of claim 2, further comprising a low pass filter coupled between an output of said mixer and an input of said local oscillator for extracting a low frequency component from said baseband error signal for tuning said local oscillator.

4. The circuit of claim 1, wherein said sampler includes an electroabsorption modulator.

5. The circuit of claim 4, wherein said sampler further comprises at least one optical amplifier for making an output power of said electroabsorption modulator less sensitive to an input power of said optical data signal.

6. The circuit of claim 1, wherein said sampler includes a plurality of concatenated electroabsorption modulators coupled to produce a switching window sufficiently narrow for sampling said optical data signal.

7. The circuit of claim 6, wherein said sampler further comprises at least one optical amplifier for making an output power of said electroabsorption modulator less sensitive to an input power of said input data signal.

8. The circuit of claim 7, wherein at least one of said plurality of concatenated electroabsorption modulators are monolithically integrated with said at least one optical amplifier.

9. The circuit of claim 1, wherein said optical detector operates at a frequency that is approximately equal to the frequency of said clock signal.

10. A method of synchronizing a clock signal having frequency of approximately f0 with an optical data signal having a frequency of $N \times f0$, where N is an arbitrary rational number, comprising the steps of:

generating said clock signal with a local oscillator;

sampling said optical data signal to produce an output signal indicative of a phase difference between said clock signal and said optical data signal;

detecting said output signal as an electrical signal;

isolating at least one harmonic of said electrical signal;

downconverting said at least one harmonic signal to a baseband error signal, and

tuning said local oscillator with said baseband error signal to synchronize said clock signal with said optical data signal.

11. The method of claim 10:

wherein said electrical signal includes a phase error component centered at approximately f0, and

wherein said isolating and downconverting steps are performed by a mixer that mixes said phase error component with said clock signal to produce said baseband error signal.

12. The method of claim 11, further comprising the step of extracting a low frequency component from said baseband error signal for tuning said local oscillator.

13. The method of claim 10, wherein said sampling step is performed by an electro-absorption modulator.

14. The method of claim 10, wherein said sampling step is performed by a plurality of concatenated electroabsorption modulators coupled to produce a switching window sufficiently narrow for sampling said input optical data signal.

15. The method of claim 14, wherein said sampling step includes the step of amplifying said output signal with at least one optical amplifier.

16. The method of claim 10, wherein said detecting step is performed by a photodetector operating at a frequency that is approximately equal to the frequency of said clock signal.

17. An optical transmission system adapted to receive a time division multiplexed optical data signal from a light source, said time division multiplexed optical data signal having having a frequency of $N \times f0$, where N is an arbitrary rational number

and f0 is a tributary rate of component signals in said time division multiplexed optical data signal, said system comprising:

at least one node comprising a clock recovery circuit for synchronizing a clock signal having frequency of approximately f0 with said time division multiplexed optical data signal, said clock recovery circuit comprising:

a local oscillator for generating said clock signal;

an electroabsorption modulator circuit for producing an output signal indicative of a phase difference between said clock signal and said optical data signal;

an optical detector coupled to detect said output signal as an electrical signal; and

a mixer for isolating at least one harmonic of said electrical signal and for downconverting said at least one harmonic to a baseband error signal,

wherein said local oscillator is tuned in response to said baseband error signal to synchronize said clock signal with said data signal.

18. The system of claim claim 17:

wherein said electrical signal includes a phase error component centered at approximately f0, and

wherein said mixer mixes said phase error component with said clock signal to produce said baseband error signal.

19. The system of claim 17, wherein said clock recovery circuit further comprises a low pass filter coupled between an output of said mixer and an input of said local oscillator for extracting a low frequency component from said baseband error signal for tuning said local oscillator.

20. The system of claim 17, wherein said electroabsorption modulator circuit comprises a plurality of concatenated electroabsorption modulators coupled to produce a switching window sufficiently narrow for sampling said data signal.

21. The system of claim 20, wherein said electroabsorption modulator circuit further comprises at least one optical amplifier for compensating for insertion losses in said plurality of concatenated electroabsorption modulators.

22. The system of claim 21, wherein at least one of said plurality of concatenated electroabsorption modulators is monolithically integrated with said at least one optical amplifier.

23. The system of claim claim 17, wherein said electroabsorption modulator circuit further comprises at least one optical amplifier for compensating for insertion losses in said electroabsorption modulator circuit.

24. The system of claim 17, wherein said optical detector operates at a frequency that is approximately equal to the frequency of said clock signal.